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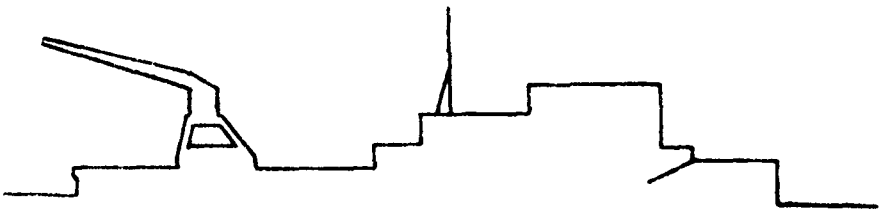
INDIAN ISLAND BOTTOM PROBE REPORT

4 January 1983



Ocean Engineering

CHESAPEAKE DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
WASHINGTON NAVY YARD
WASHINGTON, DC 20374

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INDIAN ISLAND BOTTOM PROBE REPORT

4 January 1983

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In November 1982, the Ocean Engineering and Construction Project Office, FPO 1, Chesapeake Division, Naval Facilities Engineering Command (CHESNAV FACNEGCOM) conducted a probe of the bottom off of Indian Island, Washington. A minimum of manpower and materials was required. The purpose was to (Con't)

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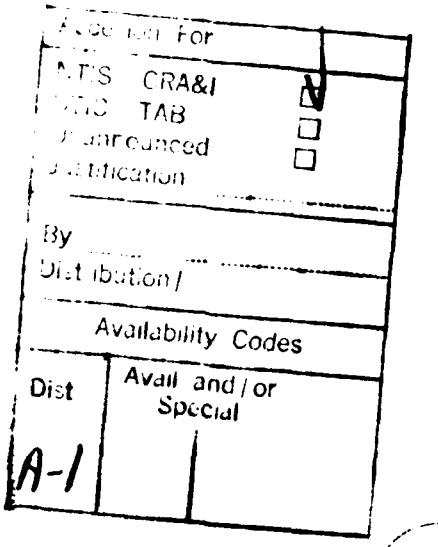
better describe the anchorage area in the vicinity of mooring #3. This mooring is to be installed by CHESNAVFACENGCOM in August 1983. The probe results indicate that the bottom consists of sand overlaid by about one foot mud and weeds.

ABSTRACT

In November 1982, the Ocean Engineering and Construction Project Office, FPO-1, Chesapeake Division, Naval Facilities Engineering Command (CHESNAVFACENGCOM) conducted a probe of the bottom off of Indian Island, Washington. A minimum of manpower and materials was required. The purpose was to better describe the anchorage area in the vicinity of mooring #3. This mooring is to be installed by CHESNAVFACENGCOM in August 1983. The probe results indicate that the bottom consists of sand overlaid by about one foot of mud and weeds.



BACKGROUND

In January 1978, the geotechnical consulting firm of Shannon and Wilson (S&W) submitted to OICC Trident the results of a subbottom acoustic survey which they conducted near Walen Point (reference 2). In the survey, S&W used two seismic energy sources and covered the 25 miles of track shown in figure 1. They used a profiling system consisting of a 10 KW transceiver operating at 4.5 KHz to best define the uppermost sediment and a pulser system operating at 250Hz at 16 joules for deeper acoustic penetration. They recorded the two outputs on a graphic recorder enabling direct comparison between the bottom data and the navigation data. From this data and from core samples made by S&W in 1975 (reference 1) they perpared an anchorage zone chart, an isopach chart, a bathymetric chart and a narrative.

Although S&W carefully obtained their data, there was considerable scepticism within CHESNAVFACENGCOM about S&W's analysis of bottom conditions, especially in the region near mooring #3. This mooring is in the design stage with installation planned for August 1983. The main concerns can be summarized as follows:

TRACK LINES IN VICINITY OF MOORING #3

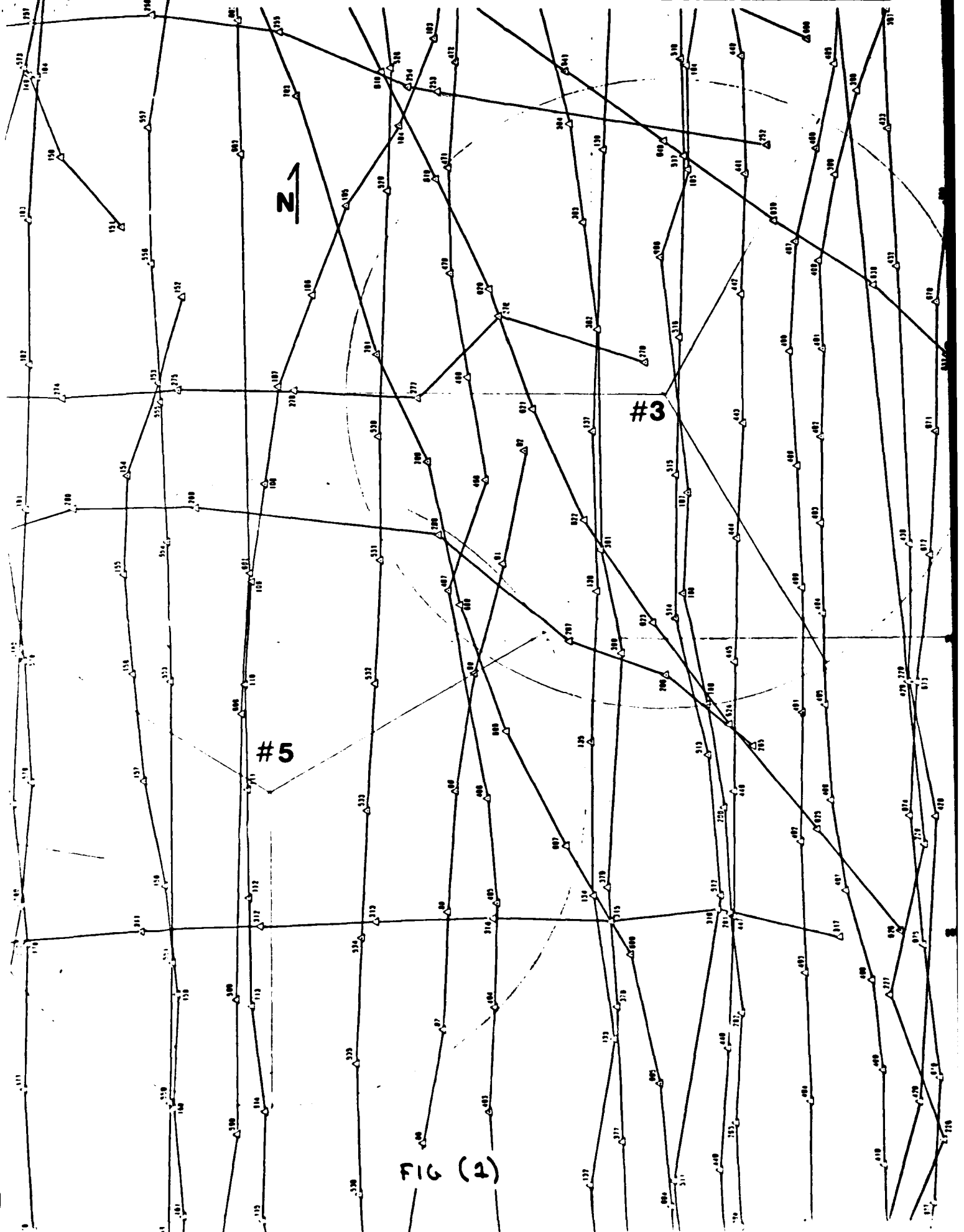


FIG (2)

1) The bathymetry clearly shows a slope in the region of Mooring #3 which appears to be an extension of the land slope. It is conceivable that this slope material is older and firmer than the flatter deposits farther away from land. However, no corings were made on the slope.

2) The acoustic profiles show the slope strata diving under the strata of the flatter region. Both regions appear to be overlaid by a third material which tapers off near the top of the slope (see figure 2). This overburden is of undetermined density. S&W proposed that it is firmer than the material directly beneath it, however past experience in the area has shown that the uppermost sediment is extremely soft.

CHESNAVFACENGCOM decided to resolve the uncertainties in October 1982 by conducting a bottom probe. In early November 1982 two engineers from CHESNAVFACENGCOM, with the help of one engineer from Naval Undersea Warfare Engineering Station (NUWES), Keyport, WA, and divers from Explosive Ordinance Disposal Group One (EODGRUONE), detatchment Keyport conducted a quick and inexpensive probe of the bottom in conjunction with a fleet mooring inspection.

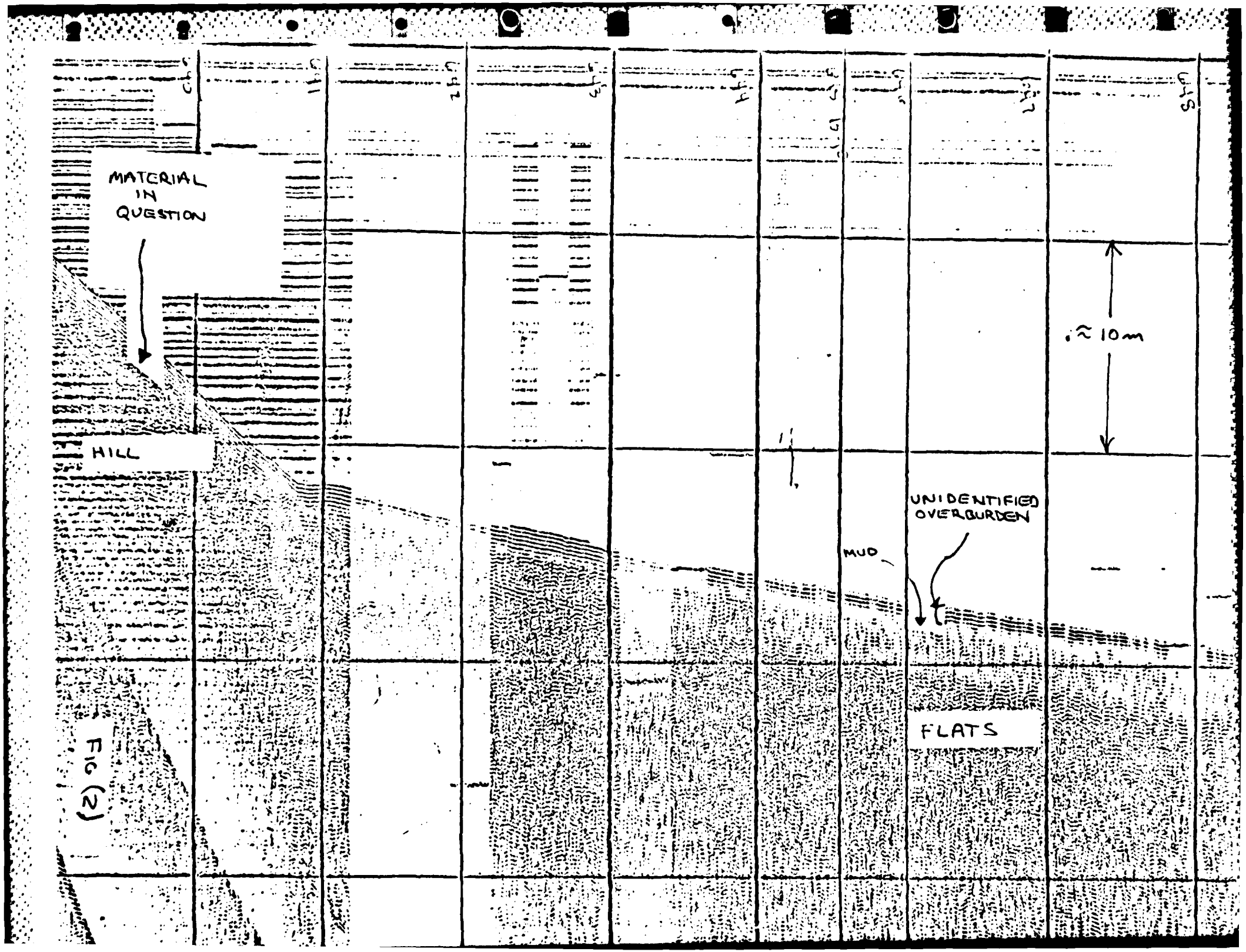

MATERIAL IN QUESTION
HILL
≈ 10m
UNIDENTIFIED OVERBURDEN
MUD
FLATS

FIG (2)

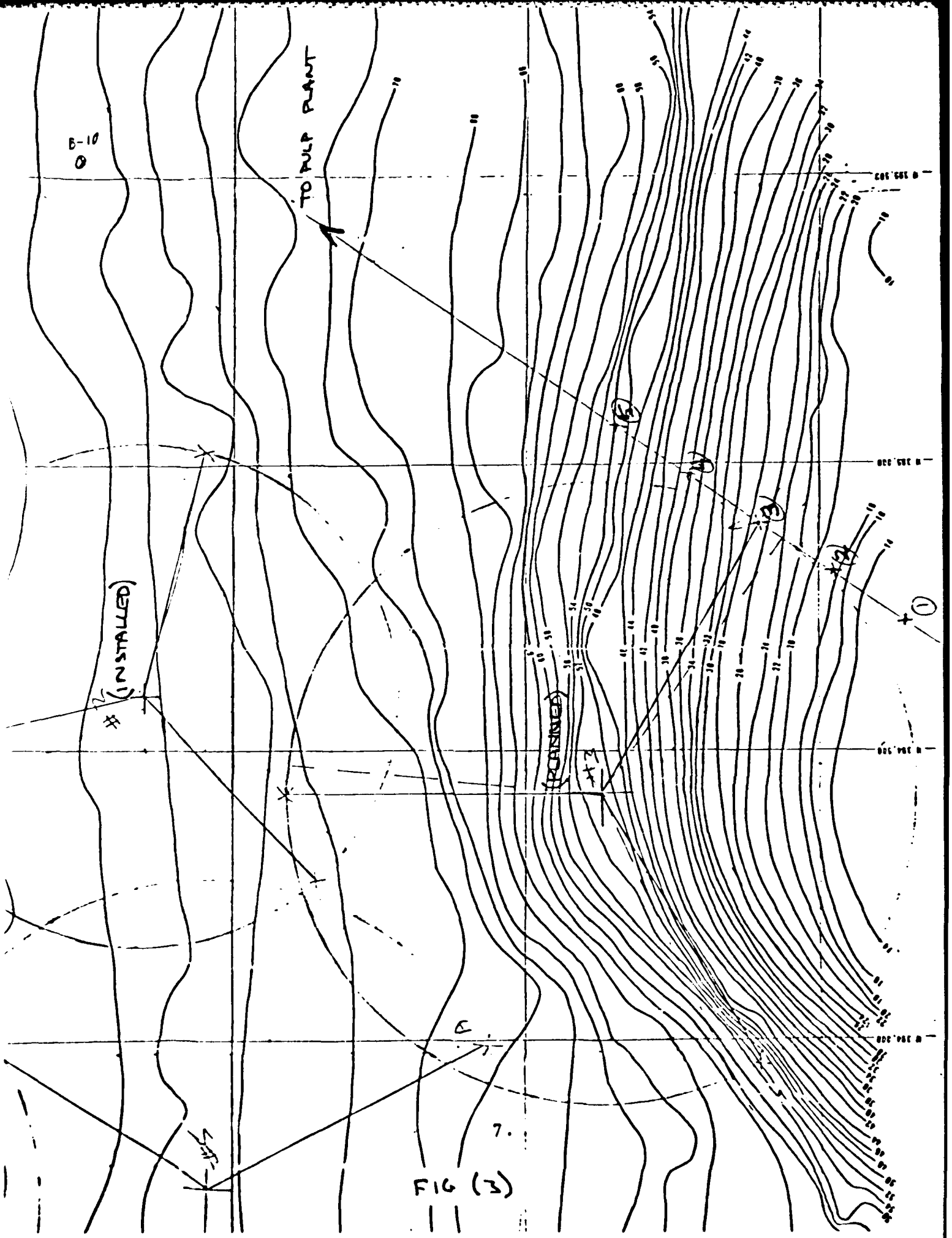
METHOD AND RESULT

The divers placed marker buoys at the location shown in figure 3. This route was chosen for its similarity to a track line from the S&W survey (reference 2.) All five points chosen are on the slope with marker #3 being very close to the proposed anchor location.

To place the marker buoys, one transit on land along with highly visible landmarks on the opposite shore were used for navigation. Marker #1 is directly in line with mooring buoys #1 and #2. The other markers are on a line between marker #1 and pulp plant across the water. Radio contact between the boat crew and the transit operator queued the release of the marker buoys. Transit angles were calculated in advance.

The probe device was 12 foot #3 rebar with a 90^{o} bend 2 feet from the top to allow a diver to apply a vertical force. A nylon rope was tied at the bend to assist in retrieval of the device if needed. The bar was marked in one foot increments with colored tape from the pointed bottom up (see figure 4).

To verify that the probe would penetrate mud, it was pushed by a diver into the deep mud near mooring #1.



7.

FIG (3)

PROBE DETAILS

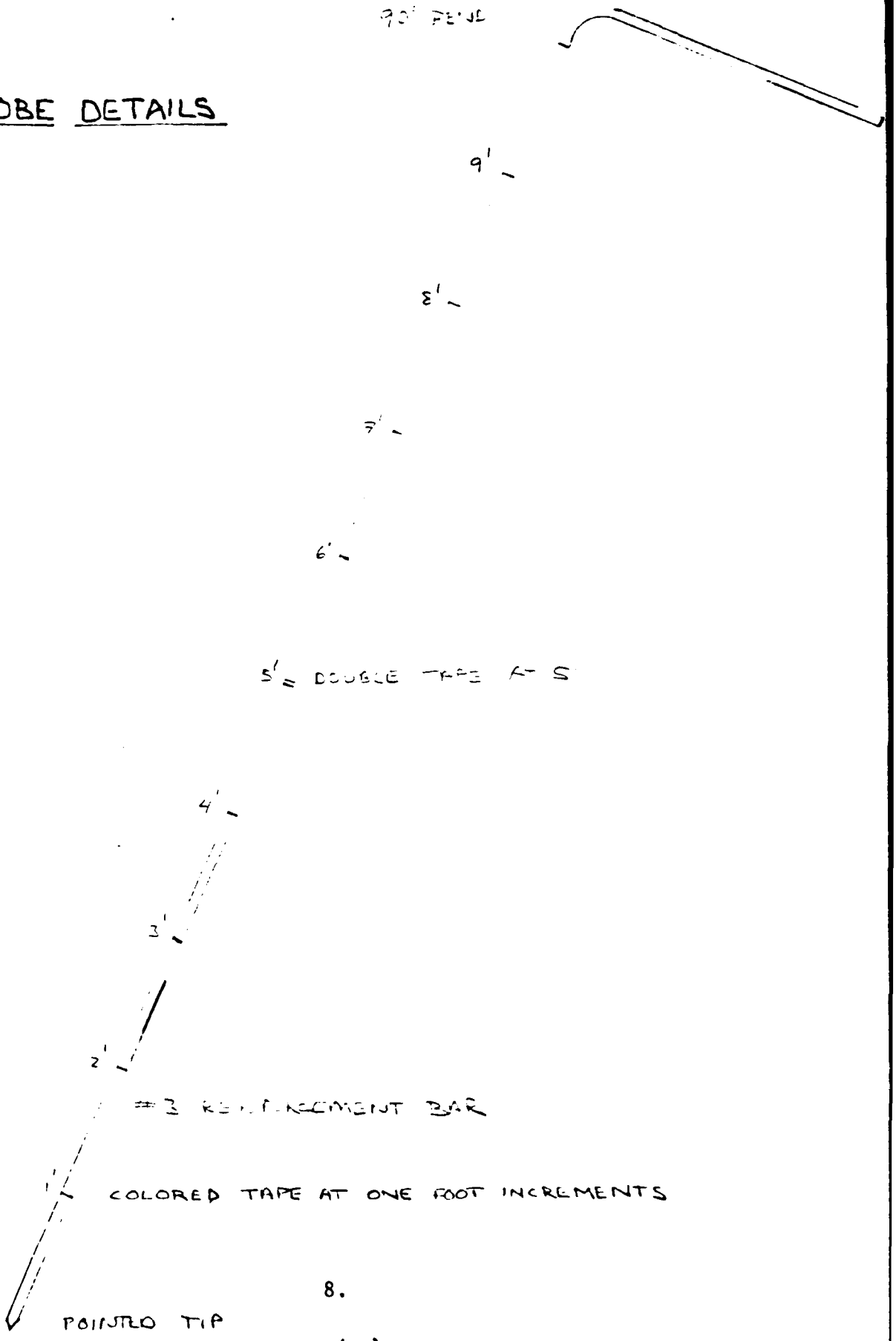


FIG (4)

With very little effort the diver was able to shove the entire probe and his arm straight down through the mud. This was repeated nearby for verification. Having established this reference, the engineer could now differentiate between firm and soft sediment.

Once the markers were installed and the engineers accepted their location, the divers quickly probed the bottom at each marker. The water depth varied from 20 to 50 feet. At each of these locations, the divers succeded in pushing in the probe between one and two feet. Very firm resistance was encountered. At one site, two divers pushing and wiggling the bar still could not force the bar in any more. This demonstrated that the overlying material here was very thin and that the material just beneath it was firm. As a further check the divers scooped out a sample of the material from just below the mud for retension by CHESNAVFACENGCOM.

CONCLUSION

In the area of the proposed anchor locations of the two hillside legs of mooring #3, we conclude that the bottom is essentially firm sand. Although only the area of leg A was probed, similar bottom conditions are assumed for the area about leg B.

REFERENCES

1) "Subbottom Acoustic Profiling Investigation, For Trident Ammunition Pier and Waterfront Facilities, Indian Island Annex, Keyport, Washington", by Shannon and Wilson, Inc., for Moffatt, Nichols and Bonny, Inc., July 1975.

2) "Report on Hydrographic and Subbottom Acoustic Profiling Survey, Proposed Indian Island Mooring Area, Indian Island Annex", by Shannon and Wilson, Inc., January 1979.